APPENDIX A 3

APPENDIX A

A.05 - 3R IMPROVEMENT - INTERSTATE SYSTEM

The following design standards are applicable for resurfacing, restoration and rehabilitation (3R) projects on the Interstate Highway System in Idaho. The projects may include resurfacing, structure replacement, or other major construction activity with other minor improvements included as a portion of the project. The intent of 3R-Interstate projects is to extend the service life of the existing highway and improve highway safety by making selective improvements to upgrade the existing facilities to current design criteria.

Funding restrictions do not always allow for improvement of all existing highways to the desired levels for new construction, but when pavement condition reaches minimal criteria, cost effective pavement improvement projects are needed and safety improvements shall be considered part of the pavement improvement project.

Many factors influence the scope of a 3R project, including:

- Roadside conditions,
- Funding constraints,
- Environmental concerns,
- Changing traffic and land use patterns,
- Surfacing deterioration rate, and
- Accidents or accident rates.

Although 3R-type improvements are normally made within the existing right-of-way, the acquisition of limited right-of-way to carry out the necessary improvements may be considered.

A.05.01 3R – Interstate Project Determination and Scope. As early as possible a determination should be made by the Department on the scope of 3R improvements for the specific section of Interstate Highway. The project data shall be summarized and design criteria documented in the Project Concept Report and must provide the greatest improvement feasible for the funds expended. As noted, even though it has been determined that 3R guidelines are appropriate, documentation of project characteristics and justification of the level of improvement are required for several elements of the design. The project concept should be reviewed and coordinated with department traffic personnel relative to planned safety improvements and expected benefits. Please refer to Section 300.00 for additional information relative to project preliminary design analysis.

A.05.02 3R – Interstate Environmental Considerations. All 3R-Interstate projects require some form of environmental documentation. A Conceptual Environmental Evaluation, ITD-651, shall be completed for the project and submitted to the Environmental section. Refer to the Environmental Manual, Pre-Design — Environmental, for procedures to follow relative to project environmental documentation.

A.05.03 3R – Interstate Design Guidelines. The minimum design guidelines for various elements of 3R-Interstate design are addressed below with some discussion of the factors that should be considered for each element.

> The appropriate highway data and analysis must be provided to document the improvement concepts being recommended for a highway improvement.

A.05.04 3R – Interstate Sideslopes. If the original construction was based on a 4: 1 (1:4) maximum sideslope, then the existing sideslope may be maintained.

Obstructions and steep slopes within the clear zone will have a cost-effective analysis. Run "Roadside," comparing do nothing, guard rail, or removal (slope flattening). If the annual do-nothing cost exceeds the cost of guard rail, then the obstacle must be protected or removed.

If the roadway is to be completely reballasted, the slopes shall be designed per the standard drawings.

A.05.05 3R – Interstate Structures. Structures repair should be programmed with the adjacent interstate section. If the deck is being repaired, then the bridge rail should also be brought up to current requirements.

A.05.06 3R – Interstate Roadway Width. The existing width of the traffic lanes and shoulders should be maintained on all overlays. The standard specifications state, "On all pavement overlays the shoe shall be 2 feet (600 mm) wide" or a 10:1 (1:10) sideslope. This should allow overlays of .2 feet (60 mm) without having to regrade the slope.

If complete project slope regrading is required in conjunction with resurfacing, then the movement of roadway centerlines towards the median with only regrading of the median slopes may be considered. This approach reduces the material and construction requirements while preserving existing established vegetation on the outside slopes. If this centerline movement is considered, care should be taken to ensure that existing longitudinal cracks are not in the wheel path of the travel lane when the overlay is placed.

A.05.07 3R – Interstate Guard Rail. Guard rail with 12 foot (3.6 meter) post spacing and/or without blockouts will be replaced. All substandard end terminals, such as a turned-down end section, will be upgraded to an appropriate end terminal, typically a Type 5 end section. Attachments to structures will be upgraded, either by modifying with an additional brush rail or replacing with a new Type 3 terminal.

Those portions of the guard rail that are still "functional" will not be changed. Items like post length, slope widening and minor height variances do not warrant removing and replacing the guard rail. If the guard rail is too low, attempts will be made to adjust the height in lieu of removing and replacing.

Also, unless major grading is involved on the project, the guard rail will be left in place in lieu of slope flattening.

A.05.08 3R – Interstate Bridge Rail. If the structure is scheduled for rehabilitation, then the bridge rail shall be brought up to current criteria. However, if the structure is not scheduled for rehabilitation, then an approved bridge rail retrofit should be installed.

A.05.09 3R – Interstate Bridge Separations. Interstate Over Minor Road (Elephant Trap). Adequate guard rail to protect motorists from reaching the obstacle must be installed. Structures 24 feet (7.3 meters) or less in length and 100 feet (30 meters) or less on center will be studied for closure between structures.

Minor Road Over Interstate. See Section 670.06 Guard rail Adjacent to Piers.

A.05.10 3R – Interstate Clear Zone. Every effort should be made to remove or shield obstacles located within the latest clear zone criteria for Interstate systems.

Trees within the clear zone will be removed unless the trees are part of a continuous group. If the trees are part of a continuous group they will be analyzed according to procedures in the Roadside Design Guide.

A.05.11 3R – Interstate Signs. Signs that are **functional** and that do not need to be moved because of project grading requirements will be retained in place.

> **Functional Requirements:** A sign should be on an approved breakaway support, if located within the clear zone, and should have good legibility day and night. The sign should be in compliance with the MUTCD. The background on guide signs and tourist information signs need not be reflectorized to be functional.

Signs that do not have an approved breakaway support and that are located within the clear zone will be replaced. Sign faces that do not have good legibility day and night will be replaced.

Signs that need to be replaced or parts of signs that need to be replaced should be done in accordance with current sign standards related to safety, reflectivity, etc.3R - Interstate Pavement

The pavement design should be based on a life cycle cost analysis with the concurrence of the headquarters Materials Laboratory, based on an approved materials report. Stage construction, i.e., inlay now and overlay in ten years, may be used if approved by FHWA.

With plant-mix pavements, every attempt should be made to justify rotomilling and inlaying so as to have a minimum impact on the slopes and guard rail.

A.05.12 3R – Interstate Crossovers. Crossovers should be brought up to the criteria shown on Standard Drawing A-7.

A.05.13 3R – Interstate Culverts. If possible, culverts in the median should be adjusted to allow construction of a Type 8 inlet.

Pipe culverts within the clear zone will be mitered to match the slope, either with a manufactured end section or a concrete headwall.

Cross drain pipes 3 feet (1 meter) and larger and parallel pipes larger than 2 feet (600 millimeters) will have a traversable grate or be extended beyond the clear zone.

A.05.14 3R – Interstate High-Accident Locations. Traffic accident records within the project zone will be analyzed to see if any locations exist where there is a concentration of accidents. Such locations will be analyzed for corrective action.

A.05.15 3R – Interstate Other Features. All other features of a project shall comply with the *AASHTO Policy on Geometric Design* (Green Book), "Interstate System," and other referenced requirements.

A.05.16 3R – Interstate Design Criteria Approval. Recommended design criteria for a specific project shall be analyzed and documented in the Project Concept Report. Generally, the 3R Design Criteria for a specific project will be established with the approval of the Project Concept Report. A copy of the Project Concept Report will be distributed to the FHWA Idaho Division Office for information.

A.10 – 3R IMPROVEMENT – NATIONAL HIGHWAY SYSTEM

The following design standards are applicable for resurfacing, restoration, and rehabilitation (3R) projects on the existing national highway system highways in Idaho, excluding the Interstate System. The projects may include resurfacing and other pavement repairs, minor widening, alterations to alignment, bridge improvements, and removal of roadside hazards. The intent of 3R-NHS projects is to extend the service life of the existing highways and, at the same time, improve highway safety by making selective improvements to highway geometry and roadside features.

A.10.01 3R – NHS Project Determination and Scope. As early as possible, a determination should be made by the Department relative to project design guidelines. Corridor Plans or appropriate standards referred to in Administrative Policy A-14-02, Roadway Widths, shall be adhered to unless lesser widths are approved as a design exception. The recommended widths in the corridor plans will be based on functional classification, area type and development, traffic volumes, safety requirements and route continuity. The recommendations shall also include consideration of community concerns and public involvement regarding environmental, scenic, historic, and preservation issues.

Deviation from Administrative Policy A-14-02 shall be documented and supported in the Project Concept Report. The project data shall be summarized and design criteria documented by completing an ITD-783, Project Concept Report. Even when it has been determined that 3R guideline's are appropriate, documentation of project characteristics and justification of the level of improvement are required for several elements of the design. The project concept should be reviewed and coordinated with the department's traffic personnel relative to planned safety improvements and expected benefits.

Project support shall be prepared and approved prior to any requests for project preliminary design review. Please refer to project preliminary design analysis for additional information. The documentation for specific 3R-NHS design guidelines are outlined in the following sections.

A.10.02 3R – NHS Environmental Considerations. All 3R projects require some form of environmental documentation. An ITD-654, Preliminary Environmental Evaluation, shall be completed for the project and submitted to the Design section. Refer to project environmental documentation procedures for further instruction.

A.10.03 3R – NHS Design Guidelines. The minimum design guidelines for various elements of 3R design are addressed below with some discussion of the factors that should be considered.

Appropriate highway data and specified analysis must be provided to justify the 3R design guidelines being recommended.

A.10.04 3R – NHS Design Speed. Design speed is the maximum safe speed that can be maintained over a specified section of highway when conditions are so favorable that the design features of the highway govern. The speed considerations for a 3R project are different from what would normally be used for new construction. For 3R improvements, the design must consider the existing highway geometrics and enhancement of the existing conditions.

The assumed design speed should be logical with respect to the character of terrain, adjacent land use, traffic characteristics, operating speeds, and planned improvements. The geometric conditions of adjacent sections must be reviewed and a uniform design speed for a significant segment of highway should be provided.

The 3R design shall use the average running speed throughout the project length for determination of minimum lane and shoulder widths.

- For horizontal curves, the design shall be based on the 85th percentile vehicle approach speeds estimated at the point where drivers have not yet reduced their speed for the horizontal curve.

- For vertical curves at hill crests where stopping sight distance is limited, the design shall be based on the 85th percentile vehicle speeds at the hill crest. Advisory speed signs will be placed at all horizontal curves where the curve safe speed is less than the posted speed.

The Project Concept Report shall indicate the average running speed being considered for the project. The average running speed can be determined by making several drive-throughs of the project observing and recording the average speed of other vehicles. This report shall also indicate the 85th percentile speed being used for horizontal and vertical curve design determinations. If there are special problems due to vehicle speeds, the report shall supply supporting field data.

A.10.05 3R – NHS Design Traffic Volumes. The normal practice is to design the project for traffic volumes forecasted 20 years after the expected date of construction. For 3R projects, the Design Traffic Volumes will be based on anticipated service life of the improvement, but not less than 8 years. The basis for the traffic volume design year selected must be explained in the Concept Report if the time frame is less than a 20-year forecast.

A.10.06 3R – NHS Roadway Widths. The design of a 3R project should not decrease the existing geometrics of the roadway section. During the concept stage, route continuity should be analyzed; and the widths selected should be consistent throughout a given section of the route with changes to be made where the route characteristics change. The width selected for two-lane rural highways shall equal or exceed the requirements listed in Figure A-1.

Figure A-1

MINIMUM ROADWAY WIDTHS
TWO LANE RURAL HIGHWAY & LOCAL ROADS(FEET)

DESIGN YEAR VOLUME (ADT)	AVG RUNNING SPEED (mph/h)	Less Than 10% Trucks			10% or More Trucks**		
		Lane Width	Shoulder Width	Total Width*	Lane Width	Shoulder Width	Total Width*
Less than 750 Vehicles	Under 50 mph	9	2	22	10	2	24
	50 mph and over	10	2	24	10	2	24
750 to 2,000 Vehicles	Under 50 mph	10	2	24	11	2	26
	50 mph and over	11	3	28	12	3	30
Over 2,000 Vehicles	All Speeds	11	6	34	12	6	36

*Note: The total width may be reduced 2 feet (0.6 meters) in mountainous terrain.

**Trucks are defined as heavy vehicles, single unit configuration or larger (6 or more tires).

Figure A-1a

MINIMUM ROADWAY WIDTHS
TWO LANE RURAL HIGHWAY & LOCAL ROADS(METRIC)

DESIGN YEAR VOLUME (ADT)	AVG RUNNING SPEED (km/h)	Less Than 10% Trucks			10% or More Trucks**		
		Lane Width	Shoulder Width	Total Width*	Lane Width	Shoulder Width	Total Width*
Less than 750 Vehicles	Under 80 km/h	2.7 m	0.6 m	6.6 m	3.0 m	0.6 m	7.2 m
	80 km/h and Over	3.0 m	0.6 m	7.2 m	3.0 m	0.6 m	7.2 m
750 to 2,000 Vehicles	Under 80 km/h	3.0 m	0.6 m	7.2 m	3.3 m	0.6 m	7.8 m
	80 km/h and Over	3.3 m	0.9 m	8.4 m	3.6 m	0.9 m	9.0 m
Over 2,000 Vehicles	All Speeds	3.3 m	1.8 m	10.2 m	3.6 m	1.8 m	10.8 m

*Note: The total width may be reduced 0.6 meters (2 feet) in mountainous terrain.

**Trucks are defined as heavy vehicles, single unit configuration or larger (6 or more tires).

The Concept Report must include data to support minimum width requirements.

Minimum width requirements for traffic lanes and shoulders have not been recommended for urban highways. Upgrading roadway widths in urban areas is not always cost effective because of physical constraints and right-of-way limitations. The scope of widening improvements for urban highways will be based upon an operations/safety analysis and will be determined on an individual project basis and should include consultation with the urban area jurisdiction. Multi-lane rural highways will be constructed to full AASHTO policy unless design exceptions are justified.

A.10.07 3R – NHS Horizontal Curvature. The improvement of horizontal curvature should be considered on the basis of existing operating characteristics and traffic volumes with curve reconstruction proposed only after full evaluation of cost effectiveness. Inconsistencies in highway geometry that require motorists to make abrupt or frequent speed changes should be analyzed for possible improvements.

Accident history provides a good indicator of horizontal curve operational problems. Detailed accident data should be studied to determine appropriate curve improvements and used for benefit cost analysis of proposed improvements. Measures such as lane widening, shoulder improvements, sideslope flattening, obstacle removal, added traffic control devices, higher standard pavement markings, and delineators are all possible minor alternatives that can be considered as options rather than curve reconstruction.

Frequently, the alignment of a highway segment consists of a series of reverse curves or curves connected by short tangents. A series of curves may be analyzed as a unit rather than as individual curves.

The improvement criteria for horizontal curves shall be as follows:

a) **Superelevation** All horizontal curves will be upgraded to current superelevation design criteria where curve safe speed is less than the 85th percentile speed of vehicles approaching the curve at the point where the approaching motorist has not yet reduced their speed for that specific curve.

b) **Curve Improvements-Speed Difference Less Than 15 mph (25 km/h)** Where the curve safe speed is less than 15 mph (25 km/h) below the 85th percentile approach running speed, then the curve will be reviewed for possible minor improvements other than reconstruction. If a horizontal curve in this category is identified as a high accident location, then the curve must be analyzed for possible reconstruction.

c) **Curve Improvements-Speed Difference More Than 25 km/h and ADT 750 or Less** Where the curve safe speed is more than 15 mph (25 km/h) below the 85th percentile approach running speed and the design traffic volumes are less than 750 ADT, the improvement criteria in Item b are applicable.

d) **Curve Improvements-Speed Difference More Than 25 km/h and ADT 750 or More** Where the curve safe speed is more than 15 mph (25 km/h) below the 85 percentile approach running speed and the design traffic volume exceeds 750 ADT, then the curve shall be reconstructed unless an analysis demonstrates that the reconstruction is not cost effective. This requirement assumes that any superelevation improvements, Item A, does not reduce the speed differential below 15 mph (25 km/h).

The curve safe speed values shall be based on approved field traffic engineering practices for determining safe operating speeds for horizontal curves using a "ball bank" indicator. If this field evaluation is not available, the curve safe speed can be determined from the design values. Evaluation of horizontal curve reconstruction must fully address right-of-way requirements, construction costs, road user benefits, and accident savings.

A.10.08 3R – NHS Vertical Curve – Hill Crests. The reconstruction of a crest vertical curve is usually not cost effective unless there are specific operational problems associated with the restricted sight distance. Improving a vertical curve has no travel time cost benefit, so the requirement for vertical curve reconstruction must be based entirely on safety.

The reconstruction of a crest vertical curve shall be considered if the following criteria are satisfied:

- The average daily traffic for the design year exceeds 1,500 vehicles per day, **and**
- The design speed (based on stopping sight distance) is more than 30 km/h below the 85th percentile running speed at the hill crest, **and**
- The hill crest hides from view a major hazard such as intersections, sharp horizontal curves or a narrow bridge.

  OR

- There are recurring accidents in the vicinity of the hill crest that can be attributed to the stopping sight distance of the vertical curve.

  The Project Concept Report shall document the 85th percentile vehicle speeds at the hill crest, design speed of the vertical curve based on minimum stopping sight distance, and the accident history related to the vertical curve. No additional data is required if the above criteria does not warrant reconstruction. Where the criteria is applicable, the following items shall be reviewed in the field and addressed in the Project Concept Report:

- Analysis of accident data that may be related to restricted vertical curve sight distance; or
- Proximity of hidden hazards to a vertical curve, such as intersections, horizontal curves, narrow bridges, and private approaches; or
- Potential for objects on roadway, such as fallen rock from rock cut or debris; or
- Cost analysis of alternatives being considered, such as doing nothing, removing hidden hazards, traffic control devices, or vertical curve improvement.

A.10.09 3R – NHS Pavement Design. Pavement design for a particular project will be based on a resurfacing survey. The District will develop the pavement structure design with the concurrence of the headquarters Materials section based on an approved Materials Report.

Asphalt pavement designs shall include a beveled pavement edge. The outside edge treatment of pavements should be specifically reviewed. Foreslope material should be provided and the drainage designed to prevent any erosion or rutting that could result in a pavement edge drop off.

On tangent sections the normal crown slopes for the traveled way shall meet the AASHTO design criteria. Pavements not in conformance with normal crown criteria shall be reconstructed to attain the required cross slope unless analysis indicates that reconstruction is not cost effective.

A.10.10 3R – NHS Bridge. A decision must be made to retain, widen or replace any bridge within the limits of a 3R project. For bridges longer than 100 feet (30 meters), replacement or widening should only be considered if required for structural adequacy or if the width is less than the approach traffic lanes. Should the bridge require replacement, the new bridge shall be designed in accordance with *AASHTO Structural Standards for Bridges*.

For bridges less than 100 feet (30 meters) in length, replacement or widening will be considered if the usable width is less than as follows:

Design Year Volumes (ADT) Planned	Usable Bridge Width Versus Width of Approaches
0 - 750	Width of approach traffic lanes
750-2000	Width of approach traffic lanes plus 2 feet (0.6 meter)
2000-4000	Width of approach traffic lanes plus 4 feet (1.2 meters)
Over 4000	Width of approach traffic lanes plus 5 feet (1.8 meters)

Evaluation of a bridge for replacement or widening shall include the following considerations in the Project Concept Report:

- Cost of replacing the existing bridge,
- Cost of widening the existing bridge if the bridge is structurally adequate, and
- Safety benefits if the bridge is widened or replaced.

If the bridge is less than 100 feet (30 meters) in length and will remain in place, then an evaluation must be made to determine what treatment, if any, is required to support the adequacy of the structure. The evaluation will address the following items:

- Structural adequacy of the bridge, bridge condition survey, and estimated life of the bridge.
- Bridge width, approach roadway widths, and roadway transition geometrics. The bridge accident experience shall be reviewed; and if there is a potential problem, then appropriate corrective measures such as improved transitions, traffic control, or other improvement measures should be recommended.
- Analysis of existing bridge rail and approach guard rail, considering structural adequacy, accident history, and potential accident risk, if existing approach and/or bridge rail is retained. Selective improvements such as guard rail upgrading, structure attachment, and guard rail retrofit must be considered and implemented unless shown by an analysis to not be cost effective.

All signing and pavement markings for bridges within a 3R project shall be upgraded to meet the requirements of the *Manual on Uniform Traffic Control Devices*.

Vertical clearances at existing underpass structures shall meet existing Department requirements or be adequately signed to warn oversized vehicles. Roadway or structure modifications shall be considered if the vertical clearance will be less than 14 feet (4.3 meters) after the planned improvements.

A.10.11 3R – NHS Sideslopes and Clear Zones. The need for safety of roadway slope improvements and the attainment of adequate roadside clear zones are highly dependent on project site specific conditions. Other roadway features, whether improved or not, can also have a significant influence on the roadside improvement requirements. As a general rule, the following slope and clear zone improvements should be made.

- Flatten sideslopes of 3:1 (1:3) or steeper at locations where run-off-road accidents are likely to occur.
- Retain current slope widths (without steepening sideslopes) when widening the roadway.
- Remove or shield isolated boulders within 10 feet (3.0 meters) of travelway.
- Remove or shield cut slopes of 3:1 (1:3) or steeper within 10 feet (3.0 meters) of travelway. Rock cut slopes beyond 10 feet (3.0 meters) of travelway should have a smooth surface. If slopes with protruding rock cannot be made smooth by removal of the protruding rock, placement of an earth berm or guard rail should be evaluated.

For safety purposes, a roadside recovery area that is as wide as practical should be provided. Because of existing topographic features and right-of-way limitations associated with 3R work, considerable judgment must be used. The clear zone must be given particular attention at identified high roadside accident locations (fixed object accidents). An evaluation should be made to determine the consistency of the clear zone throughout the project limits and then a determination of the severity of each situation should be made. The minimum clear zone width criteria in Figure A-2 can be applied to tangent roadway segments.

Additionally, in the clear zone:

- All utility poles shall be moved outside the clear zone. However, if this requires the pole to be moved beyond the right-of-way line, the pole may be placed inside the right-of-way, but as close to the right-of-way line as practical.
- All trees within the right-of-way and within the clear zone shall be removed. If the clear zone extends beyond the right-of-way, then design approval for not removing the trees must be obtained. Approval for leaving the trees may be granted for such items as decorative trees, inability to negotiate with the owner, etc. Approval for leaving other point obstacles that exist in these clear zone distances, such as minor irrigation structures, is required.
- All culverts must be protected with traversable bars, extended outside the clear zone, or extended to the right-of-way.

Appropriate adjustments must be made for clear zones on the outside of horizontal curves. If the roadway slopes and obstacle locations provide more than the minimum clear zone distance, no further analysis is required except for those locations identified as a significant roadside accident site. Where the minimum clear zone criteria is not met, a benefit cost analysis of appropriate corrective measures to mitigate the situation shall be performed with recommendations provided in the Project Concept Report for approval.

Figure A-2

3R Minimum-NHS Clear Zone Distances(English)
(Distance from edge of driving lane)

Design Speed	Design ADT	FILL SLOPES			CUT SLOPES		
		6:1 or flatter	5:1 to 4:1	3:1	3:1	4:1 to 5:1	6:1 or flatter
40 mph or less	Under 750	7	7	**	7	7	7
	750-1500	10	12	**	10	10	10
	1500-6000	12	14	**	12	12	12
	Over 6000	14	16	**	14	14	14
45-50 mph	Under 750	10	12	**	8	8	10
	750-1500	12	16	**	10	12	14
	1500-6000	16	20	**	12	14	16
	Over 6000	18	24	**	14	18	20
55 mph	Under 750	12	14	**	8	10	10
	750-1500	16	20	**	10	14	16
	1500-6000	20	24	**	14	16	20
	Over 6000	22	26	**	16	20	22
60 mph	Under 750	16	20	**	10	12	14
	750-1500	20	26	**	12	16	20
	1500-6000	26	30	**	14	18	24
	Over 6000	30	30	**	20	24	26
65/70 mph	Under 750	18	20	**	10	14	14
	750-1500	24	28	**	12	18	20
	1500-6000	28	30	**	16	22	26
	Over 6000	30	30	**	22	26	28

**Since recovery of vehicles is less likely on 3:1 slopes, this area should not be included in the clear zone distance.
The calculated clear zone should encompass the usable shoulder and the area beyond the toe of a 3:1 slope.

Figure A-2a

3R Minimum-NHS Clear Zone Distances(Metric)
(Distance from edge of driving lane)

Design Speed	Design ADT	FILL SLOPES			CUT SLOPES		
		1:6 or flatter	1:5 to 1:4	1:3	1:3	1:4 to 1:5	1:6 or flatter
65 km/h or less	Under 750	2.1	2.1	**	2.1	2.1	2.1
	750-1500	3	3.6	**	3	3	3
	1500-6000	3.6	4.2	**	3.6	3.6	3.6
	Over 6000	4.2	4.8	**	4.2	4.2	4.2
70-80 km/h	Under 750	3	3.6	**	2.4	2.4	3
	750-1500	3.6	4.8	**	3	3.6	4.2
	1500-6000	4.8	6	**	3.6	4.2	4.8
	Over 6000	5.4	7.3	**	4.2	5.4	6
90 km/h	Under 750	3.6	4.2	**	2.4	3	3
	750-1500	4.8	6	**	3	4.2	4.8
	1500-6000	6	7.3	**	4.2	4.8	6
	Over 6000	6.7	7.9	**	4.8	6	6.7
95 km/h	Under 750	4.8	6	**	3	3.6	4.2
	750-1500	6	7.9	**	3.6	4.8	6
	1500-6000	7.9	9.1	**	4.2	5.4	7.3
	Over 6000	9.1	9.1	**	6	7.3	7.9
105 or over km/h	Under 750	5.4	6	**	3	4.2	4.2
	750-1500	7.3	8.5	**	3.6	5.4	6
	1500-6000	8.5	9.1	**	4.8	6.7	7.9
	Over 6000	9.1	9.1	**	6.7	7.9	8.5

**Since recovery of vehicles is less likely on 1:3 slopes, this area should not be included in the clear zone distance.
The calculated clear zone should encompass the usable shoulder and the area beyond the toe of a 1:3 slope.

A.10.12 3R – NHS Guard Rail and Bridge Rail. Existing guard rail shall be improved to AASHTO guidelines. To determine guard rail warrants see Section 570.00 and 575.00.

Bridge rail shall be improved to AASHTO guidelines using AASHTO Clear Zone Requirements.

A.10.13 3R – NHS Right-of-Way and Access Control. Normally, additional right-of-way should not be considered for 3R projects. Additional right-of-way must be justified on the basis of cost effective operational and safety benefits.

Access control will not be established except for special circumstances where right-of-way is being obtained and access control is beneficial to satisfy future operational considerations.

A.10.14 3R – NHS Other Various Improvements. Although 3R projects generally address pavement and major geometric improvements, other minor improvements such as intersections, traffic control devices, highway approaches, and drainage structures can be considered where appropriate . If a 3R project involves grading work, then the safety benefits of slope improvements for drainage facilities and roadway approaches should be reviewed. The need for other miscellaneous operational improvements in relation to safety benefits and cost effectiveness should be analyzed.

Intersections normally account for a major portion of highway accidents. Accordingly, the accident history, traffic characteristics, and intersection operational problems should be reviewed and addressed in the Project Concept Report if there are apparent operational problems that contribute to or have a potential safety problem. Intersection improvement alternatives, such as improved traffic control devices, roadway widening, approach relocations, and special turning lanes, should be considered and justified relative to need, cost effectiveness and safety benefits.

A.10.15 3R – NHS Design Criteria Approval. Recommended design criteria shall be analyzed and documented in the Project Concept Report. In a number of circumstances, a safety benefit cost effectiveness analysis of potential improvements is also necessary. Incremental analyses of safety cost effectiveness for various levels of improvements, both above and below the cited minimum guidelines, are sometimes an appropriate approach in this analysis study. Highway geometric consistency, long-range route improvements, new construction requirements, and available resources are reasonable considerations in conjunction with the incremental improvement analysis. Generally, the 3R Design Criteria will be established with the approval of the Project Concept Report. A copy of the Project Concept Report may be distributed to the FHWA Idaho Division Office for informational purposes after approval.

A.10.16 3R – NHS Design Exceptions. In specific instances, deviation from minimum design guidelines may be appropriate and cost effective if properly analyzed and justified. The following 3R design exceptions require approval of the Design Exception Committee and must be supported by engineering analysis.

3R DESIGN EXCEPTIONS	CRITERIA
Design Traffic Volume	Based on service life of improvement, but not less than 8 years.
Roadway Widths	Roadway widths less than applicable table.
Horizontal Curvature	Rural horizontal curve improvement alternatives where the curve safe operating speed is more than 15 mph (25 km/h) below the 85th percentile approach speed and the design ADT exceeds 750 vehicles per day and conditions per A.10.7.
Superelevation & Pavement Crown Cross Slope	Curve superelevation and pavement crown that is not reconstructed to current design criteria.
Vertical Curve on Hill Crests	Vertical curve improvements for design ADTs over 1500 vehicles where the 85th percentile running speed is more than 20 mph (30 km/h) greater than the design speed and conditions per A.10.8.
Bridge Retention & Rehabilitation	Bridge widths less than the applicable table, bridge design loading less than H-15 and vertical clearance less than 14 feet (4.2 meters).
Guard Rail and Bridge Rail	Full AASHTO Guidelines.
Signs and Pavement Markings	MUTCD Guidelines.

The 3R-NHS Project Checklist (Figure A-3) can be used to ensure that all requirements have been met on a specific project.

3R - NHS PROJECT CHECKLIST				
Project No.:		Key No.:		
Project Title:				
Prepared by:		Date:		
1.	**Project Determination and Scope**	**YES**	**NO**	**N/A**
	(a) Design concept reviewed and coordinated with traffic personnel on safety improvements			
	(b) Project data documented and summarized on ITD-783			
2.	**Environmental**			
	(a) Conceptual Environmental Evaluation, ITD-651 prepared and submitted			
3.	**Design Speed**			
	(a) Design Speed(s) established.			
	(b) Average running speed determined and being used for project			
	(c) Horizontal and vertical curves - 85th percentile speed determined			
	(d) Any special speed problems noted.			
4.	**Design Traffic Volumes**			
	(a) Traffic volume is 20-year forecast, or			
	(b) Less than 20-year forecast and is explained.			
5.	**Roadway Widths**			
	(a) Basis for lane and roadway width is explained.			
	(b) Exceptions to Admin. Policy A-14-02 approved.			
	(c) Route continuity is maintained and transitions are consistent with route characteristic changes.			
6.	**Horizontal Curves**			
	(a) Super-elevations are corrected.			
	(b) Curve safe speeds determined by ball bank indicator or design value.			
	(c) Curve improvements required: None Minor Improvement Curve Reconstruction			
	(d) Curve reconstruction analyzed based on R/W, construction, road user benefits and safety.			
7.	**Vertical Curvature on Hill Crest**			
	(a) ITD-783 contains the following: 85^{th} percentile vehicle speeds. Design speed of vertical curve. Hazard hidden over hill crest or potential for roadway objects. Accident history in vicinity of hill crest.			

3R - NHS PROJECT CHECKLIST (continued)				
7.	**Vertical Curvature on Hill Crest (continued)**	**YES**	**NO**	**N/A**
	(b) Reconstruction criteria are applicable.			
	(c) Reconstruction analysis prepared.			
8.	**Pavement**			
	(a) Materials report prepared for pavement improvement.			
	(b) Beveled pavement edge or foreslope grading included in project.			
	(c) Pavement crown reconstruction analyzed.			
9.	**Bridges**			
	(a) Data included in ITD-783 structural adequacy of bridge: Bridge width, roadway approach width and transition length. Bridge accident history. Analysis of bridge rail and approach guard rail. Bridge signing and delineator relative to MUTCD. Structure vertical clearances.			
	(b) Analysis for bridge replacement.			
	(c) Analysis for bridge widening.			
	(d) Analysis for minor improvements.			
10.	**Sideslopes and Clear Zones**			
	(a) Evaluation made for clear zone distances, existing slopes and objects within clear zone.			
	(b) Accident data provided on ran-off-road and fixed-object accidents.			
	(c) Benefit cost analysis prepared on corrective measure improvements.			
11.	**Guard Rail**			
	(a) Guard rail meets AASHTO Guidelines.			
	(b) Guard rail upgrading proposal prepared			
12.	**Right-of-way**			
	(a) Additional R/W required and justified.			
13.	**Intersections**			
	(a) Intersection operations and accident history are documented.			
14.	**Traffic Control Devices**			
	(a) Field review for MUTCD compliance.			
15.	**Design Criteria Approval**			
	(a) Project 3R Design Criteria analyzed and documented.			
	(b) Incremental analysis of safety cost effectiveness on major improvements considered and prepared.			
	(c) Deviations from 3R Design Guidelines documented for FHWA approval.			

A.15 – STATE DESIGN STANDARDS FOR NON-NHS

The following standards are applicable for Federal-Aid construction on State and local highways excluding highways on the National Highway System (NHS).

Several portions of the standards indicate a minimum, desirable standard and should be used as the minimum on all highways. However, with the many financial restraints facing the state and local highway districts, the minimum standards are acceptable without further justification on the state highway system. Additionally, as long as they meet administrative policies, the minimum standards are acceptable on local facilities without further justification.

A.15.01 Non-NHS Level of Service.

Level of Service (lowest acceptable)	LOS
Heavily Developed Urban Area, High Traffic Areas, Rolling or Mountainous	**D**
Flat Rural Areas of Underdeveloped Urban Areas	**C**

In some cases, the cost of construction for the recommended level of service becomes prohibitive and a lower level of service is acceptable for economic reasons. Justification for the reduced level of service must be documented.

A.15.02 Non-NHS Traffic Volume.

Design Traffic Volumes	Design Life	Less than 1000 ADT	Greater than 1000 ADT
New Construction	20 Years	Current ADT	Projected 20-Year ADT
Rehabilitation	10 Years	Current ADT	Projected 10-Year ADT

A.15.03 Non-NHS Design Speed.

Minimum Design Speeds (Rural Conditions) Mph (km/h) for Design Volumes				
Type of Terrain	ADT 0-400 mph(km/h)	ADT 400-1000 mph(km/h)	ADT 1000-2000 mph(km/h)	ADT over 2000 mph(km/h)
Level	40(70)	50(80)	50(80)	60(100)
Rolling	30(50)	40(70)	40(70)	50(80)
Mountainous	20(30)	30(50)	30(50)	40(60)

A.15.04 Non-NHS Rural Roadway Width in Feet (Meters).

Traffic Volume	Design Speed mph(km/h)	Minimum Total Width* feet (meters)	Desirable Total Width feet(meters)
Current ADT Under 400	Under 50(80) 50 (80) and Over	22(6.6) 24(7.2)	24(7.2) 24(7.2)
Current ADT 400-1,000	Under 50(80) 50(80) and Over	24(7.2) 26(7.8)	24(7.2) 28(8.4)
Design ADT 1,000-2,000	Under 50(80) 50(80) and Over	26(7.8) 28(8.4)	28(8.4) 36(10.8)
Design ADT over 2,000	All Speeds	34(10.2)	36(10.8)
*Widths may be 2 feet (0.6 meter) narrower in rugged or mountainous terrain. Widen 2 feet (0.6 meter) on inside of small radius curves.			

If the proposed widths do not meet the widths recommended in the corridor plan or the appropriate standards referenced Administrative Policy A-14-02, the proposed widths must be approved as design exceptions.

A.15.05 Non-NHS Urban Street Width in Meters.

Number of Lanes Determined by Highway Capacity Analysis		
Width of Roadway	Minimum feet (meters)	Desirable feet (meters)
Street Lanes	10 (3.0)	12 (3.6)
Parking Lanes	8 (2.4)	10 (3.0)
Median		
Painted-Striped Separation	2 (0.6)	4 (1.2)
Raised or Curbed	2 (0.6)	6 (1.8)
Separate Left-Turn Lane	11 (3.3)	14 (4.2)

A typical 4-lane street with a median turn bay should be 64 feet (19.5 meters) from the face of curb to the face of curb including 3 feet (0.9 m) for gutter pans. A typical two-lane street with parking on both sides should be 44 feet (13.2 m) from face of curb to curb..

Standard widths, as approved by the local agency, are acceptable if they meet the minimal requirements in the table above.

(***Street lane widths do not include gutter pan. Parking lane widths include gutter pan.)***

A.15.06 Non-NHS Horizontal Curvature. Whenever possible, the horizontal curvature should match the project design speeds. Accident data should be studied, and if the curve is a high accident location, additional improvements may be warranted.

On new projects, curves with a safe speed less than 15 mph (20 km/h) below the design speed may be constructed under extreme conditions such as mountainous terrain or to avoid right-of-way damages Inconsistencies in highway geometry that require motorists to make abrupt frequent speed changes should be avoided.

On rehabilitation projects, curves with a safe speed less than 15 mph (20 km/h) below the design speed may be retained. However, improvements such as restoring superelevation, signing, lane widening, and delineation should be considered.

In all situations, adequate signing shall be installed in accordance with the MUTCD.

A.15.07 Non-NHS Vertical Curvature. On new construction, the vertical curvature should match the design speed.

On rehabilitation projects, the reconstruction of a crest vertical curve shall be considered if a, b, c, or d (one, all, or some combination) are satisfied:

a. The average daily traffic exceeds 1,500 vehicles per day;

b. The design speed (based on stopping sight distance) is more than 30 km/h below the 85th percentile speed at the hill crest;

c. The hill crest hides from view a major hazard such as intersections, sharp horizontal curves or a narrow bridge; or

d. Re-occurring accidents in the vicinity of the hill crest can be attributed to the stopping sight distance of the vertical curve.

A.15.08 Non-NHS Sideslopes.

Sideslopes	Minimum	Desirable
Ballast Slopes	3:1(1:3)	6:1 (1:6)
Fill Slope (High Fill)	1.5:1 (1:1.5)	2:1 (1:2)
Fill Slope (Low Fill)	3:1 (1:3)	6:1 (1:6)
Cut Foreslope	3:1(1:3)	6:1 (1:6)
Cut Backslope (Max)	*1.5:1 (1:1.5)	6:1 (1:6)
*.5:1 (1:0.5) allowable in rock.		

A.15.09 Non-NHS Rural Clear Zone.

Clear Zone (Rural)	Design ADT	Clear Zone in feet (meters)
40 mph (60 km/h) or Less	Under 400 Over 400	7 (2) 10 (3)
45-50 mph (70-80 km/h)	Under 400 Over 400	10 (3) 15 (5)
55 mph (90 km/h) and Over	Under 400 Over 400	12 (4) 20 (6)

Additional Notes for Clear Zone

1. All utility poles shall be moved outside the clear zone, however, if the pole would be moved beyond the right-of-way line, the pole may be placed inside the right-of-way, but as close to the right-of-way line as practical.
2. All trees within the right-of-way and within the clear zone shall be removed. If the clear zone extends beyond the right-of-way, then design approval for not removing the trees must be obtained and may be granted for such items as decorative trees, inability to negotiate with the owner, etc. Approval for leaving other point obstacles that exist in the clear zone distance, such as minor irrigation structures, is required.
3. All culverts larger than 30 inches (750 mm) must be protected with traversable bars, extended outside the clear zone, or extended to the right-of-way.

A.15.10 Non-NHS Horizontal Clearance to Obstructions (Urban). The preservation and enhancement of the environment are of major importance in the design and construction of Urban streets. A wide and level border area should be provided along urban streets for the safety of the motorist and pedestrian as well as for aesthetic reasons. The street alignment should be selected on the basis of minimizing cut and fill slopes.

Urban streets, which are curbed with no shoulders, a minimum clearance of 1.5 feet (0.5 meter) or wider where possible beyond the face of the curb should be provided. Urban streets with shoulders and without curbs should have clear zones the same as on rural highways.

Where a continuous parking lane is provided, no clearance is required but a minimum 2 feet (0.6 meter) setback to obstructions is desirable to avoid interference with opening car doors. Preferably these obstructions are located at or near the right-of-way line and outside of the sidewalks.

Other off-roadway obstacles (trees, etc.) that might seriously damage out-of-control vehicles should be removed from the roadside wherever feasible. However, the potential benefits from the removal of trees should be weighed against the adverse effects that their removal may have on the roadside environment; and trees should only be removed when necessary for reasons of safety. Depending on the conditions, only those fixed objectives that are in very vulnerable locations may be subject to removal.

Roadside barriers are not required on urban streets except where there are safety concerns or environmental considerations such as along sections with steep fore slopes and at approaches to overcrossing structures.

A.15.11 Non-NHS Guard Rail. New guard rail shall be installed according to AASHTO guidelines. Figure 5-10 (sheets 1 through 3) shall be used in determining guard rail warrant on roadway embankments.

Guard rail should be installed 2 feet (0.6 meter) outside the edge of the shoulder so the full shoulder width can be used. The rail can be placed up to the edge of the shoulder if it is introduced gradually (flare rate 20:1).

The 7’3” (2.2 meters) alternate post length as shown on Standard Drawing G-1-A-1 is acceptable for use without further warrant.

The end treatment for concrete guard rail with 10 foot (3 meters) offset as shown on Standard Drawing G-2-G is acceptable.

Existing rail may remain in place if it has 6’3” (1.9 meters) post spacing, block outs, approved end sections and variations of less than 3 inches (80 mm) in height.

A.15.12 Non-NHS Right-of-Way. No minimum right-of-way width is specified. The right-of-way width shall be sufficient to accommodate the design cross section, adequate drainage and proper maintenance.

A.15.13 Non-NHS Access Control. Access control on the State Highway System shall conform to Administrative Policy A-12-01, State Highway Access Control.
On local projects the sponsoring agency shall determine the type of Access Control.

A.15.14 Non-NHS Traffic Control Devices. All traffic control devices will conform to the Manual on Uniform Traffic Control Devices.

A.15.15 Non-NHS Environmental Considerations. All projects require environmental documentation. A Preliminary Environmental Evaluation (ITD-651, ITD-654 and ITD-654A) shall be completed for the project and submitted to the Roadway Design section. Refer to relative project environmental documentation procedures. A determination will be made based on submitted documentation as to whether additional reports or clearances will be required. A cultural resource clearance is also required, as is the wetland mitigation plan, when needed. An Environmental Mitigation Summary will be submitted with the Final Design Review Package for approval.Non-NHS Bicycle/Pedestrian Facilities

TEA 21 has placed renewed emphasis on providing facilities for bicyclists and pedestrians on or adjacent to public highways. Bicycle/Pedestrian Facilities shall be considered on all projects in or adjacent to urban areas and recreation areas. Bikeways should be provided when identified in a local bikeway plan.

The Project Concept (ITD-783A(ITD-0757) & B) shall include a discussion on how the project will handle bicycle/pedestrian facilities.

See A.40 for the criteria for bicycle facilities development.

A.15.16 Non-NHS Design Exceptions. In specific instances it may be appropriate and cost effective to deviate from the minimum design guidelines as noted in the preceding discussion.

Deviations require approval by the Design Exception Committee and must be properly supported with an adequate cost-effective analysis, or discussion based on engineering judgment or practicality.

A.15.17 Non-NHS Exceeding Standards. The standards contained herein are considered to be minimum and may be exceeded where warranted. A discussion of these areas should be included in the ITD-783 A(ITD-0757) & B, Project Concept.

A.15.18 Non-NHS Structure Standards.

Structure - New Construction

Design shall be in accordance with AASHTO Standard Specification for Highway Bridges, current editions.

The recommended width between the rail faces on the bridges will include the full approach roadway width plus shy distances, as shown in the ITD Bridge Design Standards, Section B-1. The width between the bridge rails should match the roadway guard rail width. If these recommendations are not met, the variances shall be discussed in the Concept Report.

Structures shall be designed for a minimum HS-20 live load for Local Highways and HS-25 live load for the State System.

Rails shall be any approved crash-tested bridge rail that meets the required Performance Level. Deck slab shall have a minimum thickness of 8 inches (205 mm) as noted in the ITD Bridge Design Manual.

Structure - Rehabilitation

Existing structures that are structurally adequate may remain in place if they have a minimum live load capacity of HS-15, are not Load Posted, and are a width equal to the existing roadway.

Structures built as part of a rehabilitation project or without reconstruction of the roadway may be the width of the existing roadway if there are no foreseeable plans (20 years) to reconstruct the adjacent roadway.

Structure - Single-lane Bridges (Local Highways Only)

When a full-width structure is not economically feasible, a single-lane bridge may be constructed if the following conditions are met:

1. The location is primarily on a stubbed route with limited possibilities for sizable increase in ADT.
2. ADT is 100 or less.
3. Minimum width curb to curb is 16 feet (4.8 meters).
4. Minimum HS-20 live load.

A.20 – PAVEMENT REHABILITATION (1R) STANDARDS

The following 1R standards have been approved by FHWA and are the standards to be used to meet the goals of the ITD Board in their approved pavement rehabilitation program.

To qualify for federal-aid, certain requirements must be met. The following issues must be addressed in the project concept.

1. Design life of the pavement will be a **minimum** of 8 years. This will be an **engineered** design using falling weight deflectometer, or "R" value calculations, or both. If the "R" value calculations are used, the calculations must be able to be substantiated from the soils evaluation logs. If the design calculations show an 8 year life, then the design is satisfactory.

   > If the design calculations show **more than 8 years** and with a minor increase in thickness and costs, a 20 year design can be obtained, the additional thickness should be considered.

   The ST program offers more flexible standards and pavements do not have to meet an 8 year life; however, sound engineering judgment should be used.

2. Existing geometrics. The standards outlined in the 1R standards must be met.
3. Condition of the existing pavement. The existing roadway surface should not be deteriorated to the point that reconstruction would be more cost effective.
4. Accident data. There should be no high accident locations on the section of roadway. The accident rate needs to be equal to or below the statewide average for the particular type of highway. If the project does not meet this criteria, then steps to upgrade the safety must be included in the project or programmed as a separate project.

All blunt ends, turned-down ends, unconnected bridge rails and grossly substandard rail must be upgraded on federally funded 1R projects. Cable, half moon, non-blocked rail and rail that varies by more than 3 inches (80 mm) from standard is considered grossly substandard. Additional guard rail upgrades are allowed at the district’s discretion.

If the guard rail is upgraded, clear definition is needed during programming and future cost updates. This will allow proper tracking of the costs of the rehabilitation and safety work separately.

Safety considerations may be met by phased construction, In situations where it is desirable to perform safety work along a corridor, which would combine several projects, or in conjunction with other similar safety projects, the projects may follow each other by up to three years. Phasing of safety work should only be used where it will result in improved efficiencies and significant economies of operation and have no adverse effect on safety.

Minor widening may be allowed on 1R projects where paved shoulders are less than 3 feet (1 meter) or special conditions warrant. Minor widening is generally defined as adding 2 feet (0.6 meters) or less in shoulder width. Minor grading or pulling of shoulders is also acceptable to ensure safe roadsides.

> If extensive shoulder work or major widening of the roadway is planned, then the project should be programmed as a 3R or Reconstruction Project.

A.20.01 1R – Interstate Resurfacing. The existing width of the roadway should be maintained on all overlays. The shoe width should be 2 feet (600 mm) for overlays or the equivalent of a 10:1 (1:10) side slope.

All substandard guard rail end terminals, including turned-down terminals, will be upgraded. Grossly substandard guard rail will be upgraded.

Unconnected bridge rails will be upgraded.

High accident locations will be addressed.

A.20.02 1R – NHS Resurfacing. The existing roadway must meet 3R-NHS width requirements to qualify for a resurfacing project. The design should not decrease the existing geometric conditions. ***If a section does not meet these requirements, regardless of funding source (state or federal), then a design exception is required.***

Pavement widths that do not meet 3R-NHS requirements **require a design exception.**

The shoe width should be 2 feet (600 mm) for overlays or the equivalent of a 10:1 (1:10) side slope.

All substandard guard rail end terminals, including turned-down terminals, will be upgraded. Grossly substandard guard rail will be upgraded. Structure attachments will be upgraded.

High accident locations will be addressed.

A.20.03 1R – NON-NHS Resurfacing. The existing roadway should meet the minimum geometric requirements shown in the State Standards. The design should not decrease the existing geometric conditions. The existing width should be maintained on all overlays.

All substandard guard rail end terminals, including turned-down terminals, will be upgraded. Grossly substandard guard rail will be upgraded. Structure attachments will be upgraded.

High accident locations will be addressed.

A.25 – MINOR PAVEMENT REHABILITATION/CIRCLE M PROJECTS

The department has met our pavement performance goal and we are adapting new refinements to our minor surfacing and pavement replacement strategies to sustain our strategic investment in pavements.

A projection of statewide needs will be used based on the latest pavement report, updated to include programmed improvements, minus anticipated deterioration in pavement life for the next 3 years to establish the minimum levels of minor surfacing required. The districts may use any combination of pavement strategies (reconstruction, new construction, minor surfacing, etc.) to meet the targets.

The following costs guidelines should be used in developing minor surfacing projects;

$100,000 per lane-mile for minor surfacing on Non-IM projects.

$200,000 per lane-mile on IM projects.

Projects that will exceed the above amounts will require prior approval of the CE/SHA. The minor surfacing program will continue to funded at $31.4 million.

Overlays, inlays, combination inlay/overlays, crabs, and crack & seat with an overlay for concrete pavements are approved minor resurfacing strategies

Note that hot-in-place recycling and cold in place recycling projects do not meet the minimum eight year life requirement for federal aid and as such are approved minor surfacing strategy on State funded projects only.

Micro-surfacing and seal coats are considered pavement maintenance (PM) strategies and should not be submitted as circle M's.

A.30 – REST AREA DESIGN

A.30.01 Rest Area – Site Location. The District is responsible for field reconnaissance and the selection of possible rest area sites that are geographically located in conformance with approved sites. A site analysis will be prepared in accordance with Landscape Architecture practices.

Preliminary environmental impact assessment must accompany the site analysis regardless of the type of funds to be used on the Rest Area project.

After the District has selected possible sites it shall prepare a Concept Report. The Concept Report will determine the site location for construction of the Rest Area. Items to be included in the Concept Report, for one or more sites, are as follows:

- Geological investigation recommendations for availability of water,
- Projected traffic volumes for the design year,
- Design number of users per day,
- The type of facilities to be provided,
- Amount of area required for present use and future expansion,
- Site analysis, and
- Assessment of environmental impact.

A.30.02 Rest Area – Property Purchase. If a site is to be purchased with State funds, an "option to purchase agreement" is recommended where it is advisable to ensure the State's ability to purchase the proposed site. If a site is to be purchased with Federal-aid funds, authority and approval for advance purchase must be secured from the Federal Highway Administration before a purchase agreement may be consummated. Federal-aid funds are not available if an option has been negotiated. ***Extensive design work will be deferred until the ultimate purchase has been assured.***

A.30.03 Rest Area – Field Surveying and Mapping. Major field surveying and mapping for the rest area are not to be started until the ultimate site purchase has been ensured by an executed option or by actual purchase. After the right-of-way has been secured, the following engineering and map preparation work is required.

- Establish base lines and evaluation for the preparation of a contour map.
- Locate and show on the map terrain features such as rock outcrops, crevasses, and waterways.
- Locate and show by name all trees of significant size. Also show the location of large masses of vegetation.

A.30.04 Rest Area – Health Department Regulations. In the design of rest areas, attention must be given to the distance between the arbors, the toilet buildings, and the location of wells. A specific minimum distance from arbors to toilets cannot be made because of variations in terrain and prevailing winds. However, the following points are to be considered in all rest area design:

- Direction of prevailing winds should be placed on the preliminary design plans.
- Arbors shall be located so as to take the best advantage of the terrain and prevailing winds.

The Idaho Department of Health and Welfare must approve all plans for water supplies and waste disposal areas. To expedite approval, plans are to be sent directly to the Regional Public Health Engineer.

In addition to the above main offices, there are Sanitarians in many of the Counties who may be consulted on plan development. In the development of any rest area where drinking water or sewage disposal systems are proposed, a contact is to be made with the Sanitarian at the County level regarding permits or other requirements the Health and Welfare Department may have.

A.30.05 Rest Area – Well Development. The designer shall locate the well in an area removed from the proposed location of all other rest area facilities. Well locations must meet "Idaho Drinking Water Standards" of the Idaho Department of Health and Welfare and must comply with the *Manual of Individual Water Supply Systems,* U.S. D.H.E.W.

It may be advisable to drill the well prior to design of the rest area if the well depth and quantity of water is in doubt. This will permit design of the pump, water storage and irrigation to fit the well depth and water quantity.

A.30.06 Rest Area – Design Criteria. The design of the rest area shall meet the requirements of the Uniform Building Code, Federal Accessibility Standards, and State and Local Codes while providing an open and relaxing atmosphere that is aesthetically pleasing. Past experience in rest area design and operation indicates that the following functional design criteria should be incorporated in the design:

- Toilet room fixture proportion should be approximately: men 40%, women 60%.
- Double-entry service or use handicap stall to allow shutdown of a portion for maintenance while another portion is open for each sex.
- Concrete circulation service (paved plaza) as wide as the building on auto approach side at least, preferably both sides. Minimum 8 feet (2.4 meters) completely around building where terrain permits.
- Limited lawn type turf grass adjacent to plaza.
- Lighted on all sides of building.
- No plantings that will cause shadows near building.
- Parking areas fully lighted.
- Parking areas a short distance from buildings - no winding sidewalks to building from parking areas.
- Sidewalks 8 feet (2.4 meters) wide along curbs and in heavy traffic areas.
- Orient buildings and arbors for best protection from prevailing winds and snowdrift.
- Frost-free water faucets at curbs near parking areas.
- Generous roof overhang with benches under roof.
- Trash receptacles on expanded concrete surface - not on square blocks. Large size near building - small size near arbors.

- Adequate cigarette snuffers at buildings.
- Good light inside rooms.
- Provisions for fresh air exchange in toilet rooms and low speed constant or timed-intermittent fan. Adjustable outside air inlet to furnace.
- Adequate storage shelves in custodial room.
- Minimum of two hand dryers per room. Where handicap is separate an additional dryer will be required for this room.
- Outside electrical outlet accessible to organizations serving beverages on special holidays, etc.
- Locate the 4 x 8 feet (1.2 x 2.4 meters) ITD-COMMERCE signs near buildings approach and where they will not conflict with tourist information efforts.
- Provide a flagpole for U.S. and/or State flags.
- Provide display racks in information centers.
- Locate telephones, vending machines, weather stations, etc., so they do not conflict with each other.
- Place State seal on glass entry doors.
- Water source for coffee vending machine at those locations which have information centers.
- Provide for additional telephones.
- Screened garbage (dumpster) areas.
- Provide 4 feet (1.2 meter) high chain-link security fence with locking gates around caretaker's residence.

A.35 – PEDESTRIAN OVERPASSES, UNDERPASSES, RAMPS, AND ADA REQUIREMENTS

Pedestrian overpasses, underpasses and ramps, constructed with Federal financial assistance, shall be accessible to handicapped persons, including having gradients no steeper than 10 percent (10%) unless:

(a) Alternate safe means are provided to enable mobility-limited persons to cross the roadway at that location; or

(b) It would be unfeasible for mobility-limited persons to reach the overpasses, underpasses or ramps because of unusual topographical or architectural obstacles unrelated to the federally assisted facility.

Americans with Disabilities Act requirements are to be met on all reconstruction and 3-R type projects, regardless of funding source. This includes rehabilitation projects that are being done in urban areas.

A.40 – BICYCLE FACILITY DESIGN

A.40.01 Bicycle Facilities – Glossary of Terms.

AASHTO American Association of State Highway & Transportation Officials.

BICYCLE A vehicle having two tandem wheels, propelled solely by human power, upon which any person or persons may ride.

BICYCLE FACILITIES A general term denoting improvements and provisions made by public agencies to accommodate or encourage bicycling, including parking facilities, all bikeways, and shared roadways not specifically designated for bicycle use.

BICYCLE ROUTE (BIKE ROUTE) A segment of a system of bikeways designated by the jurisdiction having authority with appropriate directional and informational markers, with or without specific bicycle route number.

BIKE LANE A portion of a roadway which has been designated by striping, signing, and pavement markings for the preferential or exclusive use of bicyclists.

BIKEWAY	Any road, path, or way open to bicycle travel, regardless of whether such facilities are designated for the preferential use of bicycles or are to be shared with other transportation modes.
CLEARANCE (Lateral)	Width required for safe passage of a bicycle as measured in a horizontal plane.
CLEARANCE (Vertical)	Height necessary for the safe passage of a bicycle as measured in a vertical plane.
CLEAR ZONE	The distance between the bikeway's edge and any fixed object capable of injuring a cyclist using the facility.
COMMUTER/ UTILITY CYCLIST	An individual who uses a bicycle primarily to reach a particular destination for practical purposes, such as to purchase or deliver goods and services, or to travel to and from work or school. Messengers are classified as utility cyclists.
CROSSWALK	(a) That part of a highway at an intersection included within the connections of the lateral lines of the sidewalks on opposite sides of the highway measured from the curbs or in the absence of curbs, from the edges of the traversable highway; and in the absence of a sidewalk on one side of the highway, that part of a highway included within the extension of the lateral lines of the existing sidewalk at right angles to the centerline. (b) Any portion of a highway at an intersection or elsewhere distinctly indicated for pedestrian crossing by lines or other markings on the surface.
GRADE SEPARATION	Vertical separation of travelways through use of a structure so that traffic crosses without interference.
HIGHWAY	A general term denoting a public way for purposes of vehicular travel, including the entire area within the right-of-way. Idaho Code Section 40-109 reads "Roads, streets, alleys, and bridges laid out or established for the public or dedicated to the public."
LEGEND	Words, phrases, or numbers appearing on all or part of a traffic control device.
MOTOR VEHICLE	A vehicle that is self-propelled or designed for self-propulsion.
MUTCD	Abbreviation for *Manual on Uniform Traffic Control Devices*, approved by the FHWA as a national standard for placement and selection of all traffic control devices on or adjacent to all highways open to public travel and accepted for use by Idaho law.
PAVEMENT MARKING	Painted or applied line(s) or legend placed on any pavement surface for regulating, guiding, or warning traffic.
PEDESTRIAN	A person whose mode of transportation is on foot and any person operating a wheelchair or a motorized wheelchair. A person "walking a bicycle" becomes a pedestrian.
RIGHT-OF-WAY	A general term denoting land or property (or interest therein), usually in a strip, acquired for or devoted to transportation purposes.
RIGHT-OF-WAY	The right of one vehicle or pedestrian to proceed in a lawful manner in preference to another vehicle or pedestrian.
ROADWAY	The portion of the highway for vehicle use, including bicycles.

RULES OF THE ROAD	That portion of a motor vehicle law which contains regulations governing the operation of vehicular and pedestrian traffic.
SEPARATED, MULTI-USE PATH	A bikeway physically separated from motorized vehicular traffic by an open space or barrier and either within the highway right-of-way or within an independent right-of-way.
SHARED ROADWAY	A type of bikeway where bicyclists and motor vehicles share the same roadway.
SHOULDER	A portion of a highway contiguous to the roadway that is primarily for use by pedestrians, bicyclists, and emergency use of stopped vehicles.
SHOULDER BIKEWAY	A type of bikeway where bicyclists travel on the shoulder of the roadway.
SHY DISTANCE	The distance a cyclist maintains from a fixed object such as guard rail, fences, etc.
SIDEWALK	That portion of a street between the curb lines, or the lateral lines of a roadway, and the adjacent property lines intended for use by pedestrians.
SIDEWALK BIKEWAY	Usually discouraged except in a few special circumstances covered in the AASHTO Guide for the Development of Bicycle Facilities.
SIGHT DISTANCE	The length of a roadway or pathway ahead, visible to the cyclist.
TRAFFIC CONTROL DEVICES	Signs, signals, or other fixtures, whether permanent or temporary, placed on or adjacent to a travelway by authority of a public body having jurisdiction to regulate, warn, or guide traffic.
TRAFFIC VOLUME	The given number of vehicles that pass a given point for a given amount of time (hour, day, year).
TRAVELWAY	Any way, path, road, or other travel facility used by any and all forms of transportation.
VEHICLE	Any device in, upon, or by which any person or property is or may be transported or drawn upon a public highway and includes vehicles that are self-propelled or powered by any means.

A.40.02 Bicycle Facilities – The "Design Bicyclist." Transportation improvements intended to accommodate bicycle use must address the needs of both experienced and less experienced riders. One solution to this challenge is to develop the concept of a "design bicyclist" and adopt a classification system for bicycle users which includes the following:

Group A-Advanced Bicyclists

Experienced riders who can operate under most traffic conditions, these bicyclists comprise the majority of the current users of shoulder bikeways and shared lanes on arterial streets and are best served by:

- Direct access to destinations, usually via the existing street and highway system.
- The opportunity to operate at maximum speed with minimum delays.
- Sufficient operating space on the roadway or shoulder to reduce the need for either the bicyclist or the motor vehicle operator to change position when passing.

Group B-Basic Casual Bicyclists

These bicyclists are less confident of their ability to operate in traffic without special provisions for bicycles. They include casual or new adult and teenage riders as well as serious riders who are uncomfortable cycling in traffic. These bicyclists require:

- Comfortable access to destinations, preferably by a direct route, and either low-speed, low-traffic-volume streets or designated bicycle facilities.
- Well-defined separation of bicycles and motor vehicles on arterial and collector streets (bike lanes or wide shoulders) or on separated, multiple-use paths.

Group C-Children

Preteen riders whose roadway use is initially monitored by parents. Eventually these riders are accorded independent access to the system. Children and their parents require provisions of separated, multiple-use paths and:

- Access to key destinations surrounding residential areas, including schools, recreational facilities, shopping, or other residential areas.
- Residential streets with low motor vehicle speed limits and volumes.
- Physical separation (multi-use pathways) of bicycles and motor vehicles on arterial and collector streets.

Generally, Group A bicyclists will be best served by designing all roadways to accommodate shared use by bicycles and motor vehicles. Group B/C bicyclists will be best served by a network of low volume neighborhood streets and separated, multi-use pathways.

Full implementation of this approach will result in a condition where every street will incorporate *at least* the design treatments recommended for group A bicyclists. In addition, a network of routes will be *enhanced* by incorporating the bicycle facilities recommended for group B/C bicyclists.

A.40.03 Bicycle Facilities - Types and Design Standards

Bicycles are legally classified as vehicles and can be ridden on all public roadways in Idaho. Therefore, proper accomodations must be designed to allow bicyclists to ride in a manner consistent with motor vehicle operation. Four basic types of facilities (urban-arterial, collector, residential, and all rural roadways) can accommodate bicycle travel. Figures A-4 thru A-9 describes each type of facility.

Figure A-4

FACILITY IMPROVEMENTS FOR EXPERIENCED BICYCLISTS (Group A & Some Group B)

KEY	***ROADWAY TYPE***			
XXX Most appropriate XX May be appropriate X Least appropriate --- Not required	**URBAN**			**RURAL**
	ARTERIAL	COLLECTOR	RESIDENTIAL	ALL ROADS
OVER/UNDERPASS	XX	---	---	---
TRAFFIC SIGNALS	XX	XX	---	---
SHARED LANE*	XX	XXX	---	XX
SHOULDER BIKEWAY **	XX	XX	---	XXX
BICYCLE LANE ***	XXX	XXX	---	X
MULTI-USE PATH ****	XX	XX	---	XX

Figure A-5

FACILITY IMPROVEMENTS FOR
CASUAL (Group B) & CHILDREN (Group C) BICYCLISTS

KEY XXX Most appropriate; XX May be appropriate; X Least appropriate; --- Not required	***ROADWAY TYPE*** **URBAN**			**RURAL**
	ARTERIAL	COLLECTOR	RESIDENTIAL	ALL ROADS
OVER/UNDERPASS	XXX	XX	---	---
TRAFFIC SIGNALS	XXX	XX	---	---
SHARED LANE *****	X	X	XXX	X
SHOULDER BIKEWAY **	X	X	---	XX
BICYCLE LANE ***	X	XX	XX	X
MULTI-USE PATH ****	XXX	XXX	XX	XX

**** Shared Lane***

On a shared facility, bicyclists and motorists share the same travel lanes. Shared facilities are common on city street systems and roads with limited right-of-way. Shared lanes can be considered an acceptable solution when there is inadequate width to designate bike lanes or provide shoulder bikeways.

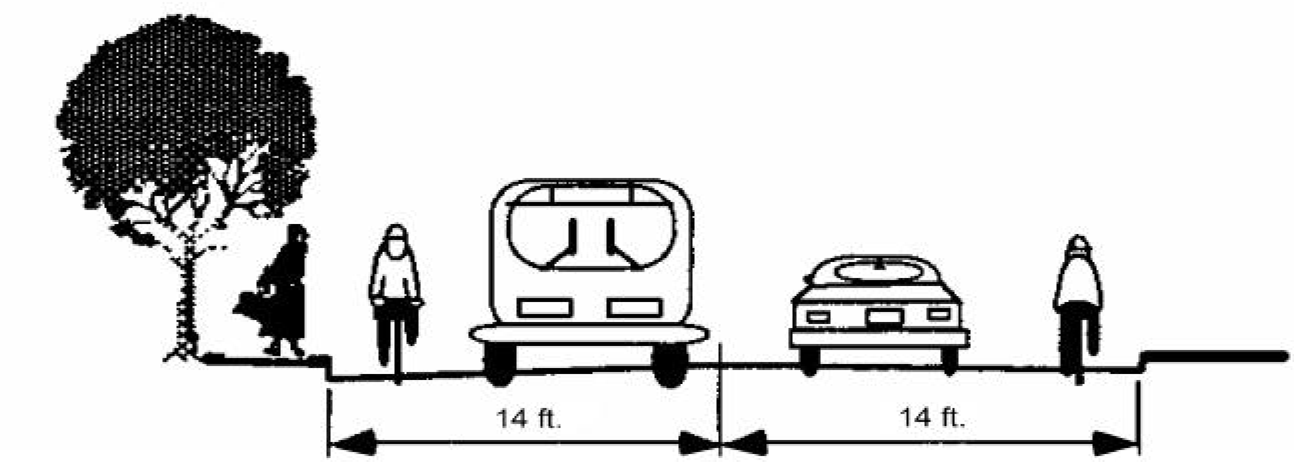


Figure A-6

A lane with 14 feet (4.2 meters) of usable width is desired in an urban setting, which allows a motor vehicle and a bicycle to operate side by side. Usable width would normally be from curb face to lane stripe, but adjustments may need to be made for drainage grates, parking, and longitudinal ridges between pavement and gutter sections. Widths greater than 14 feet (4.2 meters) may encourage the undesirable operation of two motor vehicles in one lane.

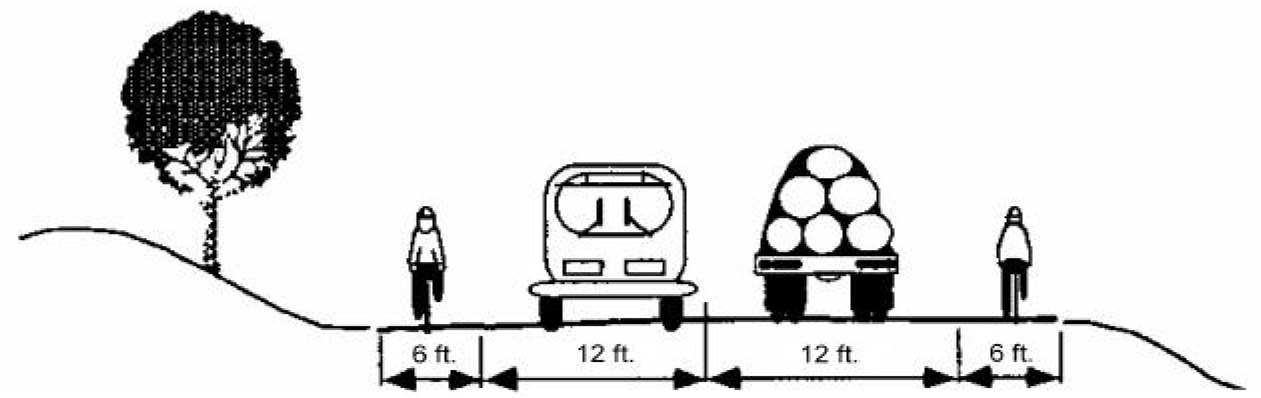
In this situation, consideration should be given to striping a bicycle lane or shoulder bikeway.

***** Shoulder Bikeway***

Smooth, paved roadway shoulders provide a suitable area for bicycling, conflicting little with faster-moving motor vehicle traffic. Rural bicycle travel on the state highway system is accommodated on shoulders. Optimum shoulder width for bicyclists should be 6 feet (1.8 meters) or greater. If there are severe physical width limitations, a minimum 4 foot (1.2 meter) shoulder may be adequate. Shoulder areas against an ordinary curb face should have a 5 foot (1.5 meter) minimum width or 4 feet (1.2 meters) from the longitudinal joint between a monolithic curb and gutter and the travel way. Shoulder widths of 5 feet (1.5 meters) are recommended from the face of a guard rail or other roadside barriers. Adding or improving shoulders can often be the best way to safely accommodate bicyclists in rural areas, and they are also a benefit to motor vehicle traffic. In severely restricted areas, even minimal width shoulders, 2-3 foot (0.6-0.9 meter), is an improvement over no shoulder at all.

Bicycle accommodation along routes, where rumble strips are installed as a necessary design treatment for safety reason, requires special consideration for available shoulder width. The minimum shoulder width should be increased to 5.5 feet (1.7 meters). Refer to Design Manual Section 335.11 for further guidance on rumble strips and Standard Drawing C-2-A & B for design requirements.

Figure A-7



*Min: 5 ft. against curb or guard rail, 4 ft. open shoulder

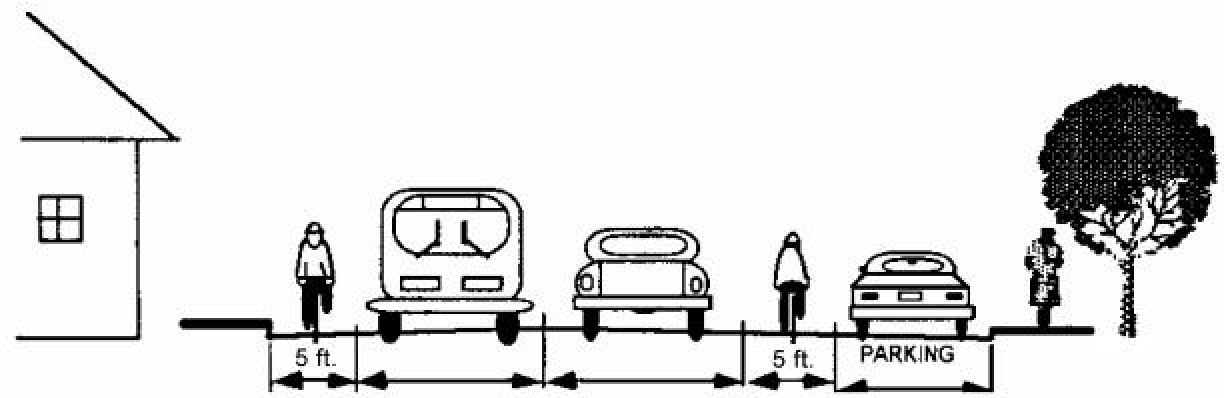
****** Bicycle Lane***

A bicycle lane is a portion of the roadway that is designated for preferential use by bicyclists. Bicycle lanes are very common in urban areas and must always be well marked and signed to call attention to their preferential use by bicyclists (refer to *Manual on Uniform Traffic Control Device & AASHTO 1999 Guide for the Development of Bicycle Facilities)*.

Bicycle lanes are established on urban arterial and major collector streets. The minimum width for a bike lane is 4 feet (1.2 meters), or 5 feet (1.5 meters) from the face of a curb or guard rail A clear riding zone of 4 feet (1.2 meters) should be present if there is a longitudinal joint between the pavement and the monolithic curb and gutter section. Bicycle lanes in excess of 6 feet (1.8 meters) in width are undesirable as they may be mistaken for a motor vehicle lane or parking area.

Refer to the Traffic manual or the *Manual on Uniform Traffic Control Devices & AASHTO 1999 Guide for the Development of Bicycle Facilities* for detailed specifications for pavement striping, stenciling, and signing of bicycle lanes.

Figure A-8



*Min: 5 ft. against curb or guard rail, 5 ft. lane next to parking

If parallel parking is permitted, the bike lane must be placed between the parking area and the travel lane and have a minimum width of 5 feet (1.5 meters).

Bicycle lanes must always be one-way facilities and carry bicycle traffic in the same direction as adjacent motor vehicle traffic. On one-way streets the bicycle lane should be on the right side of the roadway, except in areas where a bike lane on the left will decrease the number of conflicts (e.g., those caused by heavy bus traffic or dual right-turn lanes, etc.).

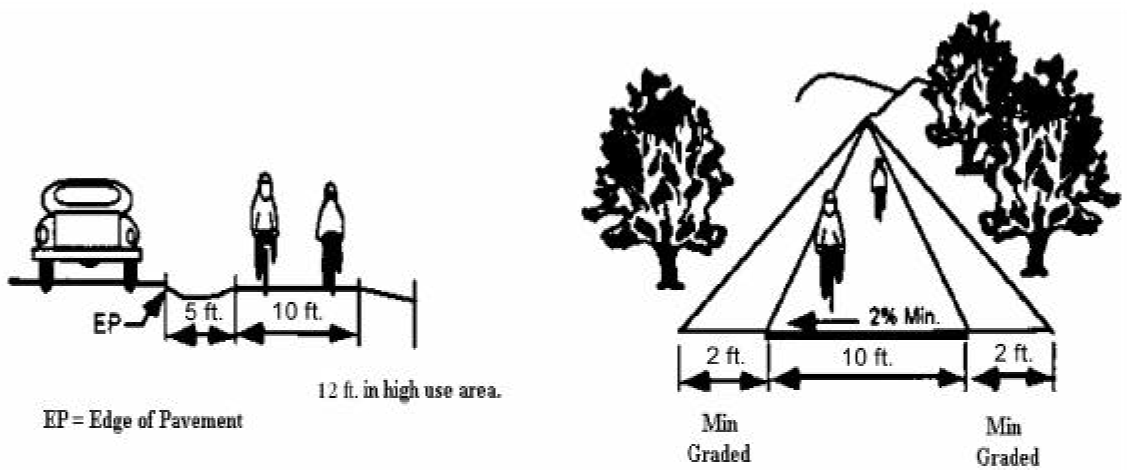
******* Separated, Multiple-Use Path***

A multiple-use path is a bicycle facility that is either physically separated from motor vehicle traffic by an open space or barrier, or separated within the roadway or independent right-of-way. Separated paths are normally two-way facilities. They may be appropriate in corridors not served by other bikeways, if there are few intersecting roadways.

Where a separated path must be parallel and/or near to a roadway, there must be a 5 foot (1.5 meter) minimum width separating the multiple use path and the roadway, or a physical barrier of sufficient height (usually 4.5 feet [1.4 meters]) must be installed.

Ten feet (three meters) is the standard width for a separated, multiple-use path. Paths should be 12 feet (3.6 meters) wide in areas with high bicycle volumes or when used by a combination of bicyclists, pedestrians, skaters, and joggers. A minimum 2 feet (0.6 meter) clear zone should be maintained adjacent to both sides of the pathway to provide clearance from poles, trees, fences, and other obstructions.

Figure A-9



Multiple-use paths provide excellent bicycle transportation, especially where the path is truly isolated from motor vehicles, such as along greenways or railroad corridors. *Special care must be taken to limit the number of at-grade crossings with streets or driveways*. Poorly designed paths can put cyclists in a position where the driver of a motor vehicle does not expect them. Motorists are generally looking for traffic on the roadway and may not see a cyclist on a separated pathway.

Paths with two-way bicycle traffic should not be placed on or adjacent to roadways. Otherwise, a portion of the cyclists ride against the normal flow of motor vehicle traffic, which is contrary to the rules of the road, with the following consequences:

- Bicyclist and motorists may collide, as right-turning drivers at intersections and driveways rarely look to their right. The drivers simply fail to see approaching bicyclists who are riding against traffic.
- Some bicyclists ride improperly against the normal flow of traffic to reach the path or continue on against traffic where the path ends. Wrong-way riding is a major cause of bicycle/motor vehicle accidents.

Pathways of 8 feet (2.4 meters) are not recommended in most situations because they attract users and soon become overcrowded. If necessary, they should only be constructed where long-term usage is expected to be low, where there is minimum pedestrian use, and with proper horizontal and vertical alignment, which ensure good sight distances. Multiple-use paths built along streams and in wooded areas present special challenges. The roots of shrubs and trees, especially cottonwoods, can pierce through the path surface and cause it to bubble up and break apart in a short period of time. Preventative methods include removal of vegetation, realignment of the path away from trees, and placement of root barriers along the edge of the path.

A.40.04 Bicycle Facilities – Reference Publications. The Design manual guidelines are adequate for most situations. However, many factors affect the specific application for any given roadway or traffic situation. Therefore, the design professional should consult other sources for more detailed specifications prior to finalizing facility design. These publications are considered supplements to this manual and the standards described adopted by reference:

ITD Maintenance Manual: Facility maintenance, repair, and operations.

ITD Traffic Manual: Signing, marking, and striping.

Manual on Uniform Traffic Control Devices: Signing, marking, and striping.

AASHTO 1999 Guide for the Development of Bicycle Facilities: Width and clearance, design speed, horizontal alignment and superelevation, grade, sight distance, and others.

For additional technical assistance, reference materials, or general information, contact the Bicycle and Pedestrian Planner at the Idaho Department of Transportation, P.O. Box 7129, Boise, ID 83707, phone (208) 334-8272.

A.40.05 Bicycle Facilities – Design Exceptions. In certain instances it may be necessary and cost effective to deviate from minimum design guidelines. These deviations require approval by the Design Exception Committee and must be properly supported with an adequate analysis and discussion of justification for the exception.

A.40.06 Bicycle Facilities – Preliminary Checklist. Figure A-10 is a checklist of items that are required for consideration of Bicycle Facilities. For project development procedures see Special Projects Sub-section 315.04.

Figure A-10

Bicycle Facilities Preliminary Checklist			
Date:	Project No.:	Key No.:	
Project Name:			
Project Location:			
A)	**Standard Plan Sheets REQUIRED (11 x 17 format)**		
	All references are to the Design Manual unless otherwise stated		
	Title Sheet		
	Standard Drawing Index		
	Vicinity Sketch (8 ½ x 11 format)		
	Project Clearance Summary		
	Typical Sections		
	Erosion Control Plan		
	Horizontal Alignment Plan, vertical		
B)	**Optional Sheets**	**YES**	**NO**
	Profile Sheet		
	Roadway		
	Bridge(s)		
	Pipe Culvert(s)/Pipe Siphon(s)		
	Irrigation Pipe(s)		
	Sewer Pipe(s)		
	Pipe Underdrain(s)		
	Total Ownership Map		
	Signing Plan		
	Pavement Markings		
	Traffic Control Plan		
	Drainage Plans		
	Minor Structure Plans		
	Source Plats		
C)	**Standard Specification REQUIRED**		

	SSP 637, Bikeways and Pathways
	Special Provisions, Standard Inserts
	Sediment and Erosion Control Plan
	NPDES Storm Water Control Plan (if over 5 acres)
	Preliminary Cost Estimates
D)	**Preliminary Environmental Checks (ITD-654 & 654A)**
Bicycle Facilities Preliminary Checklist (continued)	
E)	**Concept Approval Inclusions**
	Project Description and Typical Sections
	Vicinity Sketch (same as "A" above)
	ITD-783 & 783A(Form 0757), Design Standards
	Project Estimate and Right-of-way Certification
F)	**ITD Material Phase Report(s) — Bicycle Path Projects**
A Phase 2,3, and 5 combined materials report REQUIRES an abbreviated discussion of the following items.	
	Introduction and General Project Description
	Vicinity Sketch
	Typical Section
	Borrow Source Data (commercial sources)
	Borrow and Aggregate Source Plats
	Aggregate Estimating Data
	Aggregate Sources (commercial sources)
	Surface and Sub-surface Water
	Topsoil
	Base
	Paving
	Compaction
	Dust Abatement
	Source and Material Cost
	Special Provisions
	Notes to the Contractor
A Phase 2,3, and 5 combined materials report MAY ALSO INCLUDE discussion of the following items.	
	Aggregate Inventory Report
	Soils Report Summary
	Sub-subgrading
	Slope Design Summary
	Retaining Walls
	Blanket Coarse or Filter Material
	Pipe
	Riprap
	Surface Treatment
	Seal

A.45 – INTELLIGENT TRANSPORTATION SYSTEM

"Consideration of ITS elements will include analysis of cost effectiveness and comparison of Idaho's current ITS planning documents with the project location and goals. The State of Idaho Intelligent Transportation Systems Strategic Plan identifies specific applications for deployment on various routes throughout the state and should be used as a guide in determining the types of ITS elements to consider. Results from the consideration may include identification of ITS elements as part of a larger project or a project that consists exclusively of ITS deployment.

"ITS projects are eligible for all categories of Federal funds as long as they comply with the National ITS Architecture. Within Idaho's ITS planning document a statewide architecture has been detailed from the National Architecture and should be followed in designing specific ITS project components."

A.50 – INTERCHANGES, INTERSTATE/EXPRESSWAY

An interchange is defined as a system of interconnecting roadways in conjunction with one or more grade separations that provides for the movement of traffic between two or more roadways or highways on different levels. Interchanges are utilized on freeways and expressways where access control is important. They are used on other types of facilities only where crossing and turning traffic cannot be accommodated by a normal at-grade intersection.

A.50.01 Interchange Spacing. Interchanges should be located close enough together to properly discharge and receive traffic from other highways or streets, and far enough apart to permit the free flow and safety of traffic on the main facility. In general, more frequent interchange spacing is permitted in urbanized areas. Minimum spacing is determined by weaving requirements, ability to sign, lengths of speed change lanes, and capacity of the main facility.

Interchanges within urban areas should not be spaced closer than an average of 2 miles, in suburban sections an average of not closer than 4 miles, and in rural sections an average of not closer than 8 miles. In consideration of the varying nature of the highway, street or road systems with which the freeway or expressway must connect, the spacing between individual adjacent interchanges will vary considerably. In urban areas, the minimum distance between adjacent interchanges should not be less than 1 mile, and in rural areas not less than 2 miles. (See Administrative Policy A-12-01 – State Highway Access Control)

A.50.02 Interchange Type. The most commonly used types of interchanges are the diamond, cloverleaf and directional.

The diamond interchange is the most common type where a major facility intersects a minor facility. The capacity is limited by the at-grade intersections at the crossroad.

Cloverleaf or partial cloverleaf designs may be used in lieu of a diamond when development or other physical conditions prohibit construction in a quadrant, or where heavy left turns are involved. A continuous flow design is required where two major facilities intersect. In this case, a cloverleaf interchange is the minimum design that can be used.

Directional interchanges are the highest type and most expensive. They permit vehicles to move from one major highway to another major highway at relatively fast and safe speeds.

A.50.03 Interchange Ramp Design. An interchange ramp is a roadway that connects two legs of an interchange. Elements contributing to horizontal and vertical alignments are designed similar to any roadway once the ramp design speed has been determined.

A.50.04 Interchange Ramp Design Speed. In order to design horizontal and vertical alignment features, a design speed must be determined for each ramp. Since the driver expects a speed adjustment on a ramp, the design speed may vary within the ramp limits.

A.50.04.01 Diamond Ramp Design Speeds. When ramps terminate at an intersection where all traffic is expected to make a turning movement or come to a complete stop, the minimum design speed along the ramp should be 40 km/h. When a "through" movement is provided at the ramp terminus, the minimum ramp design speed should meet or exceed the design speed of the highway facility for which the through movement is provided. The design speed along the ramp will vary depending on alignment and controls at each end of the ramp. An acceptable approach to determining design speed along the ramp is to set the design speed at the exit or entrance nose equal to the posted mainline speed limit and 40 km/h at the ramp terminus. The appropriate design speed for any intermediate point on the ramp is then proportional and based on its location relative to those two points.

A.50.04.02 Loop Ramp Design Speeds. Loop ramps may have a high-speed condition at one end and, either a slow or high-speed condition at the other. Loop ramps, because of their short radius, usually have design speeds in the lower range for the middle and slow speed end of the ramp, with middle range design speeds occasionally used nearer the high speed terminal. See Table X-1 (1994 AASHTO Green Book).

A.50.05.03 Directional Ramp Design Speeds. Directional ramps generally have high-speed conditions at both ends. They are normally designed using a design speed in the upper range of Table X-1 (1994 AASHTO Green Book). The absolute minimum should be the middle range design speeds.